MONTREAL ENGINEERING COMPANY LIMITED

Founded 1907

Consulting and Operating
Engineering Services

Owned and Operated by Professional Engineers

Montreal Engineering Company, Limited is an independent Canadian company organized to provide a broad range of engineering services on an international scale to government and industry. It is owned and operated by its directors and senior professional staff.

Since its founding, the Company has had extensive experience in the design, supervision of construction, operation and management of electric power systems, and in the design and supervision of construction of a variety of municipal utilities and industrial plants.

In the electric power field, it has engineered over 65 hydro and 25 thermal electric generating stations having a total capacity of more than two million kw in many parts of the world. Associated with these stations has been the design and installation of distribution systems and transmission systems at all voltage levels, including more than 2,000 circuit miles of transmission lines of 110 kv and over.

As a result of its activities, the Company has acquired an international reputation and over the past 50 years has engineered and supervised the construction of major projects in Central and South America, the West Indies and Asia, as well as in Canada. Some of these are described briefly in this brochure.

MONTREAL ENGINEERING COMPANY, LIMITED

244 ST. JAMES ST. W.,
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Montreal, P.Q.

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MONTREAL ENGINEERING COMPANY, LIMITED

provides

consulting, operating and management services

to

Government and Industry.

These services include:

- Surveys
- Water Studies
- Preliminary Investigations
- Soil Investigations
- Engineering Reports
- Cost Estimates
- Assessment of Capital Requirements
- Studies of Operating Budgets
- Preparation of Construction Programmes
- Detailed Design and Specifications
- Supervision of Construction
- Land and Right of Way Purchases
- Contract Negotiations
- Purchasing and Expediting
- Economic Reports
- Operation and Management of Utilities
- Property Inventories
- Appraisals and Depreciation Studies
- Utility Accounting
- Corporate Administration

Our experience has covered hydro, steam, diesel and gas turbine electric generating plants, gas processing plants, pipelines and compressor stations, transmission and distribution systems, communications and remote control systems, water filtration and treatment plants and pulp and paper mills.

Officers and Directors

G. A. GAHERTY, D.Eng., LL.D., B.Eng., P.Eng. — PRESIDENT

DALHOUSIE UNIVERSITY, 1909.
PAST PRESIDENT: C.E.A.

Chairman of the Board: Calgary Power Ltd.

President and Director: Montreal Engineering Company Limited, Ottawa Valley Power Company, Farm Electric Services Ltd., Calgary Water Power Company.

Director: Atomic Energy of Canada Ltd., Maritime Electric Company Limited, Royal Securities Corporation Limited, Trans-Canada Pipe Lines Limited.

Member: Canadian Trade Mission to Great Britain, 1957.

Member: Royal Commission on South Saskatchewan River Project, 1952.

Vice-President: International Conference on Large Electric Systems (C.I.G.R.E.).

Recipient: Julian C. Smith medal for "Achievement in the Development of Canada".

Fifty years experience in planning, design, and management of electric utilities.

F. KRUG, P.Eng. — VICE-PRESIDENT

COOPER UNION, NEW YORK, 1916.
NEW MEXICO SCHOOL OF MINES, 1917.
M.I.T., 1925.
FELLOW, A.I.E.E.

Chairman of the Board: International Power Company Limited.

President and Director: Canadian International Power Company Limited, Monterrey Railway, Light & Power Company.

Vice-President and Director: Montreal Engineering Company Limited.

Director: Financiadora Venezolana de Creditos, C.A., Arcturus Investment & Development Ltd., The United Corporation, New York.

Recipient: Citation Award from Cooper Union (1956).
"For his work in promoting better international relations".

Recipient: Gano Dunn Medal of the Cooper Union Alumni (1959).

Forty-five years experience in planning and management of electric utility systems in the Caribbean area and in Central and South America.

D. STAIRS, O.B.E., M.C., D.Eng., LL.D., B.Eng., P.Eng. — VICE-PRESIDENT

DALHOUSIE UNIVERSITY, 1909.

President and Director: Newfoundland Light & Power Company Limited, Maritime Electric Company Limited.

Vice-President and Director: Montreal Engineering Company Limited.

Director: Calgary Power Ltd., Ottawa Valley Power Company, Nova Scotia Light & Power Co. Ltd., Royal Securities Corporation Limited.

Director General of Construction: Department of Munitions and Supply, Ottawa, 1940 - 1945.

Deputy-Controller: Power Control, Department of Munitions and Supply, Ottawa, 1943 - 1945.

Fifty years experience in planning, organizing, and managing power systems.

G. H. THOMPSON, M.C., B.Sc., P.Eng. — VICE-PRESIDENT

McGILL, 1913.
PAST PRESIDENT: C.E.A.

President and Director: Calgary Power Ltd.

Vice-President and Director: Montreal Engineering Company Limited, Calgary Water Power Company Limited.

Director: Newfoundland Light & Power Company Limited, Ottawa Valley Power Company, Calgary Power Investments Ltd., Farm Electric Services Ltd.

Forty-five years experience in planning, design, supervision and management of electric power systems.

M. G. TAYLOR, M.Sc., B.Eng., P.Eng. — VICE-PRESIDENT

ACADIA UNIVERSITY, 1925.
NOVA SCOTIA TECHNICAL COLLEGE, 1927.
M.I.T., 1931.

President and Director: International Power Company Limited, Bolivian Power Company Limited, Empresas Electricas Venezolanas, S.A.

Vice-President and Director: Montreal Engineering Company Limited.

Director: Canadian International Power Company Limited, Monterrey Railway Light and Power Company, Oriente Electric Company, Unicorp of Canada Ltd.

Thirty-five years experience in operating and managing electric power utilities in Central and South America and Canada.

A. W. HOWARD, B.Sc., P.Eng. — VICE-PRESIDENT

UNIVERSITY OF TORONTO, 1935.
PAST PRESIDENT: C.E.A.

President and Director: Calgary Power Investments Ltd.

Vice-President and Director: Montreal Engineering Company Limited, Calgary Power Ltd., Farm Electric Services Ltd.

Director: Newfoundland Light & Power Company Limited, Maritime Electric Company Limited.

More than twenty-five years experience in operating and managing electric power utilities in Canada.

C. RITCHIE, B.Sc., P.Eng. — VICE-PRESIDENT AND GENERAL MANAGER

UNIVERSITY OF ALBERTA, 1935.

Vice-President and Director: Montreal Engineering Company Limited.

More than twenty-five years experience planning power projects and managing hydraulic, electrical and mechanical engineering activities connected with thermal and hydro-electric power developments and municipal and industrial engineering projects.

P. W. RAYMER, GENERAL MANAGER, INTERNATIONAL OPERATIONS

UNIVERSITY OF KENTUCKY.

Vice-President and Director: International Power Company Limited, Bolivian Power Company Limited.

Director: Montreal Engineering Company Limited, Canadian International Power Company Limited, Empresas Electricas Venezolanas, S.A., Monterrey Railway, Light and Power Company.

Forty years experience in operating and managing electric power utilities in the Caribbean area and in Central and South America.

G. L. GILKER, R.I.A., SECRETARY-TREASURER

Secretary-Treasurer: Montreal Engineering Company Limited, Maritime Electric Company Limited, Arcturus Investment and Development Ltd.

Treasurer: Ottawa Valley Power Company.

Secretary: Unicorp of Canada Ltd.

Thirty-five years accounting experience in the electric utility field in Canada and Latin America.

H. J. McLEAN, P.Eng., DIRECTOR CONSTRUCTION

UNIVERSITY OF TORONTO.

Director: Montreal Engineering Company Limited.

Specialist in the design and construction of earth fill dams. Thirty-five years experience investigating, planning and supervising construction of power developments in Canada, the Caribbean and Central and South America.

J. K. SEXTON, B.Sc., P.Eng., — DIRECTOR CIVIL ENGINEERING

UNIVERSITY OF SASKATCHEWAN, 1928.

Lecturer: University of Alberta, 1931-1933.

Vice-President: International Commission on Large Dams.

Director: Montreal Engineering Company, Limited.

More than thirty-years experience in operation, investigation, design and construction of power developments including assignments in North, South and Central America, Europe and Asia.

Engineering, Management and Purchasing

W. R. DAVIS, B.Sc., P.Eng — ENGINEERING MANAGER

UNIVERSITY OF ALBERTA, 1934.

Twenty-seven years experience in design, installation and operation of power, transmission, distribution and radio communication systems in North and South America and Asia.

W. K. CARRUTHERS, B.Sc., P.Eng.— DIRECTOR MECHANICAL ENGINEERING

UNIVERSITY OF ALBERTA, 1933.

Technical Maintenance Officer and O.C. HQ Coy Signals, 3 Canadian Infantry Division, 1940-1945. Twenty-one years experience in design, construction, supervision and operation of hydro and thermal power plants.

J. S. FOSTER, B.Eng. (Mech.) B.Eng. (Elec.) P.Eng. — MANAGER DOUGLAS POINT PROJECT

DALHOUSIE UNIVERSITY, 1943-1946.

Assigned to Atomic Energy of Canada Ltd. in 1953 for rehabilitation of the NRX reactor. In 1955 appointed Senior Design Engineer for the NPD project. In 1958 appointed Deputy Manager of AECL's Nuclear Power Plant Division in charge of engineering a 200 mw nuclear power station. Presently manager Douglas Point Project co-ordinating the design and construction of a 200 mw nuclear power station.

A. DOBSON. P.Eng., AMI Mech. Eng., AMASME — CHIEF MECHANICAL ENGINEER

KINGSTON TECHNICAL COLLEGE, ENGLAND, 1951.

Fifteen years experience in the design, construction and operation of thermal electric generating stations, process steam and steam heating projects in the U.K., South Africa, Canada and Central and South America.

G. V. ECKENFELDER, B.Sc., P.Eng.— MANAGER WESTERN DIVISION

UNIVERSITY OF ALBERTA, 1933.

Twenty-three years experience conducting field investigations, preparing designs and supervising the construction of hydro plants in Canada and the Far East. Since 1958 has been manager of Calgary office supervising company operations in the Western provinces, the Yukon and North West Territories.

J. K. C. MULHERIN, B.Sc., P.Eng. — CHIEF CONSTRUCTION ENGINEER

UNIVERSITY OF NEW BRUNSWICK, 1945.

Joined the company in 1946 as construction engineer. Since then has had wide experience in the administration and supervision of construction of power and industrial plants and municipal services, much of which has been gained in the arctic and sub-arctic regions of Canada.

N. RIVINGTON, B.Sc., P.Eng., — CHIEF ELECTRICAL ENGINEER

QUEENS UNIVERSITY, 1942.

Has had extensive experience in the design of the electrical features of a variety of hydro and thermal electric generating plants and in the investigation, planning, design and construction of transmission and distribution systems, radio communications and remote control facilities for electric power utilities and other industrial organizations in North, Central and South America and Asia.

W. J. SMITH, B.Sc., P.Eng. — CHIEF CIVIL ENGINEER

QUEENS UNIVERSITY, 1942.

Specialist in hydraulic turbine and governor problems. Has had more than fifteen years experience in the investigation, planning and supervision of civil design of some twenty hydro power developments in Canada, India, South and Central America.

H. L. HURDLE, O.B.E., B.Sc., P.Eng. — ASSISTANT TO PRESIDENT

UNIVERSITY OF ALBERTA, 1933.
CANADIAN WAR STAFF COURSE, 1945.

Past President: Canadian Signals Association.

Vice-President: Canadian National Committee of the International Conference on Large Electric Systems (C.I.G.R.E.).

Director: Canadian Electrical Association.

Twenty years experience in the electrical design, planning, operation and management of electric utilities.

C. F. MALLORY, M.Sc., B.Sc., P.Eng. — ASSISTANT TO VICE-PRESIDENT

UNIVERSITY OF NEW BRUNSWICK, 1948.
M.I.T., 1956.

Director: Maritime Electric Company Limited, Newfoundland Light & Power Company Limited.

Since 1948 engaged in planning, design, construction and operation of electric utilities in Canada and Latin America.

M. C. ARCHIBALD, B.Sc., B.Sc. (ELECT. ENG.) P.Eng. — DIRECTOR OF PURCHASING

DALHOUSIE UNIVERSITY, 1931.
NOVA SCOTIA TECHNICAL COLLEGE, 1933.

Eight years engineering experience in the electric utilities field. Twenty-one years experience in purchasing materials and equipment for all components of hydro and thermal developments.

J. KAZAKOFF, B.E.E., P.Eng. — ASSISTANT VICE-PRESIDENT, INTERNATIONAL POWER COMPANY LIMITED

UNIVERSITY OF SASKATCHEWAN.
McGILL UNIVERSITY, 1935.

Vice-President and Director: Bolivian Power Company Limited.

Director: International Power Company Limited, Monterrey Railway, Light and Power Company, British Security Co-ordination, 1942-45.

Twenty-four years experience in design, operation, supervision and management of electric utilities in Latin America.

Personnel

During the course of the years Montreal Engineering Company Limited has developed a group of experienced engineers, technicians and other employees whose services are available on either an individual or a company-wide basis. Our employees are skilled in the operation, management and corporate administration of utility companies both large and small. They have had wide experience in engineering design and construction of electric power systems and a wide range of general industrial and mechanical engineering works.

Engineering

The range of engineering services provided both government and industry includes preliminary investigations, surveys, engineering reports, cost estimates, assessment of capital requirements, operating budgets, preparation of construction programs, detailed designs and specifications and supervision of construction. The Company offers a complete engineering service and experienced engineers are available under the undivided responsibility and direction of Montreal Engineering Company Limited.

Construction

Montreal Engineering Company Limited has supervised construction of many large electric generation, hydraulic and industrial projects in Canada, Central and South America and Asia. As a result its construction department, comprised of a competent group of area supervisors supported by more than 30 resident field engineers, is a seasoned organization thoroughly experienced in all phases of construction work. An experienced contracts group is available as well to provide expert service and advice in connection with all types of construction tenders and contracts.

Purchasing

The purchasing department of Montreal Engineering Company Limited with its staff of more than thirty is fully equipped to provide complete procurement services for any project. Its experience includes the purchase of electric power generation, transmission and distribution systems, pulp and paper mills, gas pumping stations and municipal water, sewage and central heating systems. At present it is handling the purchasing and expediting for over thirty projects as well as looking after the daily operating requirements of six electric power companies in Canada and Latin America.

Installations have ranged from the Arctic Circle to the Tropic of Capricorn and from Western Canada to India. Consequently its sources of supply are world wide and it is thoroughly familiar with all aspects of the export and import business. It has its own forwarding office in New York to handle all shipments from Canada and the U.S.A. to Latin America. Annual purchases exceed $20,000,000.

Hydro Electric Power Developments

Completed surge tank seen before the installation of its frost casing.

RATTLING BROOK

Newfoundland (1958)

HEAD: 330 feet

CAPACITY: 17,000 hp

This development consists of a reservoir on Rattling and Amy's Lakes, an intake structure, a mile of wood-stave pipe, a surge tank 312 feet high, 1,000 feet of steel penstock and a powerhouse containing two Francis turbines. It is the main power supply for the Gander International Airport and the pulp and paper communities of the Exploits River valley.

The two identical generators in the Rattling Brook Plant feed into the Newfoundland Light & Power Company 66,000 volt system through unit connected transformers rated 6750/9000 kva.

SNARE FALLS

Northwest Territories (1960)

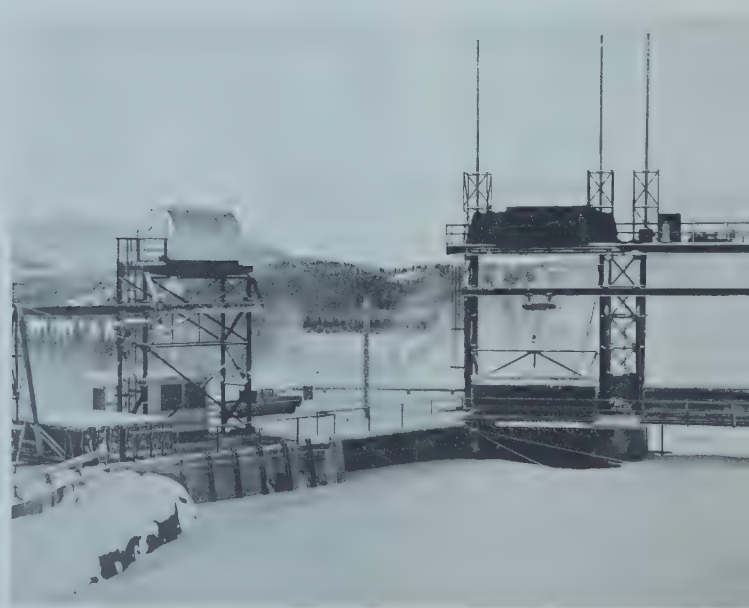
HEAD: 63 feet

CAPACITY: 9,500 hp

Designed for the Northern Canada Power Commission, this compact development, located 10 miles below the Snare Rapids development on the Snare River, consists of a rock fill dam, short canal and tunnel to a powerhouse containing one Kaplan turbine.

Power is produced by a 7,000 kva generator and is subsequently stepped up to 115 kv by a bank of two 4,500 kva, 3 phase transformers. A continuously acting voltage regulation is employed at this plant to provide for stable operation while charging the 100 miles of 115 kv line to which it is connected.

Snare Falls forebay showing compact arrangement of intake and spillway.



POCATERRA - INTERLAKES

Kananaskis River, Alberta (1955)

HEAD: 210 feet (Pocaterra)
114 feet (Interlakes)

CAPACITY: 18,400 hp (Pocaterra)
6,900 hp (Interlakes)

These two small developments utilize storage provided on the Kananaskis Lakes at the headwaters of the Kananaskis River by earthfill storage dams. The Pocaterra development consists of a 90 foot high earthfill dam, a reinforced concrete intake, a 4,400 foot long woodstave pipeline, a pressure relief stand pipe, a 465 foot long buried steel penstock and a powerhouse containing a single Francis turbine driving a 15,000 kva, vertical waterwheel generator.

The Interlakes development consists of a 350 foot penstock connected to the downstream end of an existing 300 foot reinforced concrete conduit through the dam and a powerhouse containing a single Francis turbine and a 5,600 kva generator.

These plants are unattended and operated by remote control from the Kananaskis Control Centre 35 miles distant. Their output is delivered into the Calgary Power system through a common transformer.

Pocaterra woodstave pipeline and relief standpipe during installation of frost casing.

The penstock and powerhouse of Interlakes hydro-electric development during construction.

Mountainside canal high in the Andes, a part of the Santa Rosa high head development.

SANTA ROSA

Bolivia (1955)

HEAD: 2,720 feet

CAPACITY: 8,750 hp

This development consists of a masonry diversion dam, a mountainside canal and a tunnel leading to a steep steel penstock supplying a single impulse turbine and 7,500 kva generator. Santa Rosa is typical of the ten plants designed by Montreal Engineering Company Limited for the Bolivian Power Company. Located in the Andes at elevations from 8,500 ft to 15,500 ft all are high head developments presenting special problems in transport, supply and organization which have required an intimate knowledge of work in mountain terrain at high altitudes.

MENIHEK

Labrador (1954)

HEAD: 34 feet

CAPACITY: 23,100 hp

This development consists of an earth fill dam four miles long plus concrete sluice and intake dams over which the Quebec North Shore and Labrador Railway crosses the Ashuanipi River. The powerhouse contains two 6,000 hp propellor type turbines. A third unit of Kaplan design developing 11,100 hp was addeed in 1959. The generators are rated 5,000 kva each for the first two units and 12,000 kva for the third.

Churchill River, Saskatchewan (1959)

ISLAND FALLS

CAPACITY: 19,000 hp (109,000 hp existing)

This extension utilized two sluice gate openings in the existing dam of the Churchill River Power Company for the installation of a new 19,000 hp propellor turbine. The sluice openings were converted from free discharge passages to pressure conduits to supply water to the new unit. The unit is a semi-outdoor type serviced by the gantry crane in the existing powerhouse which is provided with a moveable end wall. Crane rails were extended to the new unit.

MURDOCK-WILLSON

Shipshaw River, Quebec (1957)

HEAD: 276 feet

CAPACITY: 80,000 hp

This development designed for Price Brothers & Company Limited consists of an intake from the existing head pond at Chute Murdock, over one mile of woodstave pipe 18 feet inside diameter believed to be the largest continuous woodstave pipe in the world, a differential surge tank, a half mile of steel pipe and penstock of ring girder design tapering from 18 feet to 15 feet diameter and a power station containing one Francis turbine.

The 60/70 mva, 13.8 kv generator and its auxilliaries are completely automatic and are remotely supervised from Kenogami. Control signals and telemetering information are passed between the control centre and the power station over a telephone circuit.

Some idea of the size of this pipeline can be gained by comparison with the man in the middle ground.

WHITEHORSE RAPIDS

Whitehorse, Yukon (1958)

HEAD: 63 feet
CAPACITY: 15,000 hp

This development utilizes the drop of the rapids on the Lewes River immediately upstream of the town of Whitehorse. It consists of an earth fill dam, concrete spillway with sluice gates, earth canal, a three-unit intake structure, three 12½-foot diameter penstocks, and a powerhouse with two turbines in the initial installation. Special consideration was given to the heating of the hydraulic works to permit winter operation.

To facilitate the migration of fish, an extensive system of fishways was designed in collaboration with the Department of Fisheries.

MAGGOTTY FALLS

Jamaica (1959)

HEAD: 313 feet

CAPACITY: 8,400 hp

The Maggotty development is an automatic run-of-river project consisting of a small diversion dam, a concrete pipe, a woodstave pipe, a tunnel and a steel penstock to the powerhouse containing one Francis unit. Hydraulic conditions necessitated the use of both a relief valve and a surge tank to adequately control pressure surges in the pipeline.

The 7,500 kva generator is connected to the Jamaica Public Service Company's transmission system through a three phase transformer. The plant, operating at 40 cycles will be changed later for 50 cycle operation.

The steel pipe bridge crossing Black River. Part of Maggotty Falls water conduit system.

KUNDAH

State of Madras, India (1960)

HEAD: 1,180 feet (Plant No. 1),
2,870 feet (Plant No. 2)

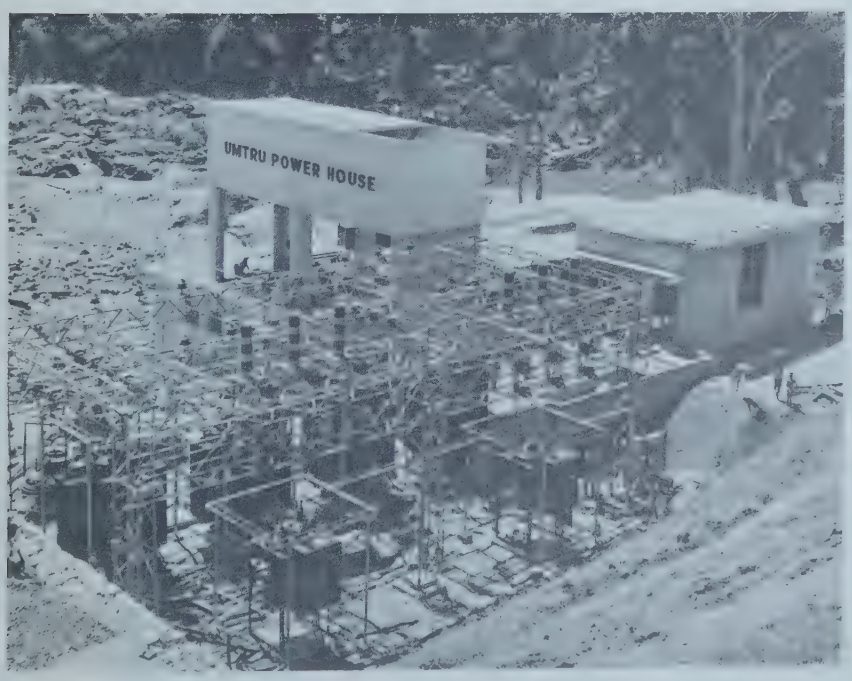
CAPACITY: 57,500 hp (Plant No. 1),
200,000 hp (Plant No. 2)

This development for the Madras State Electricity Board consists of two power stations in the Nilgiri Hill region of southern India and entails construction of four large dams, three major tunnels totalling 34,160 feet, six penstocks totalling 27,800 feet, 1,800 feet of low pressure pipe 9 to 11 feet in diameter, in addition to the two power houses.

Powerhouse No. 1 contains two vertical impulse, turbines of 28,750 hp each. Powerhouse No. 2 contains four similar units of 50,000 hp each. The project includes 323 miles of single and double circuit transmission lines for operation at 230 kv and 110 kv. Substations and substation extensions total 544,000 kva.

Design work is presently under way for one additional unit at each plant and a third plant with 24,000 kva of generation is also being designed. These three units are scheduled for commissioning in 1964.

Powerhouse No. 2 of the Kundah project located in the Nilgiri Hill region of South India.



Umtru was the first hydro-electric development in the State of Assam and also the first power project of significant size in that section of India.

UMTRU

State of Assam, India (1956)

HEAD: 200 feet

CAPACITY: 10,500 hp

Not only was this the first hydro development in the State of Assam, it was also the first power project of significant size in this section of India. The development consists of a masonry diversion dam, tunnel, steel penstock and powerhouse containing three Francis turbines. The high flood flows of the monsoon season necessitated design of the structure for almost complete submergence and placing the powerhouse entry through the roof.

Three 3,500 kva, 50 cycle generators are installed and are connected to the Assam State Electricity Board's 34.5 kv system through three single phase transformers.

A view of the Spray No. 2 unit surge tank and penstock descending the mountain-side.

The Rundle intake structures with the new addition in the foreground.

SPRAY-RUNDLE

Spray River, Alberta

(1951 Extensions 1960)

PLANTS: Three

HEADS: 50 ft, 905 ft, 325 ft.

CAPACITIES: 3,600 hp, 124,000 hp, 66,000 hp.

This sequence of three plants utilizes the 1,300 feet of head between the Spray Lakes Reservoir and the Bow River at Canmore.

The main reservoir of 200,000 acre feet is created by 200 foot and 60 foot rolled fill earth dams. The latter known as the Three Sisters Dam is founded on gravel and river wash. It controls the release of water from the reservoir through a 3,600 hp propellor type unit which can be bypassed at low reservoir stages into a canal system for the next plant downstream.

This canal system some 7 miles in length, comprising tailrace cut, artificial lakes, tunnel side hill cuts through rock, silt and permafrost finally delivers the water into the concrete lined pressure tunnel of the Spray No. 1 Plant and the penstock of the No. 2 Plant.

The stainless steel Francis runners of 62,000 hp each in this plant are among the first to operate under as high a head. Two and a half miles of canal and pipeline link the Spray plant to the 66,000 hp Rundle plant which discharges the water back into the Bow River at a point 40 miles downstream from the main Spray dam.

The five generators in these plants contribute an aggregate of 154 mva of capability to Calgary Power's Bow River system. The transmission voltage is 138 kv, with air blast circuit breakers used for switching. The control of this development is accomplished from the Kananaskis Control Centre.

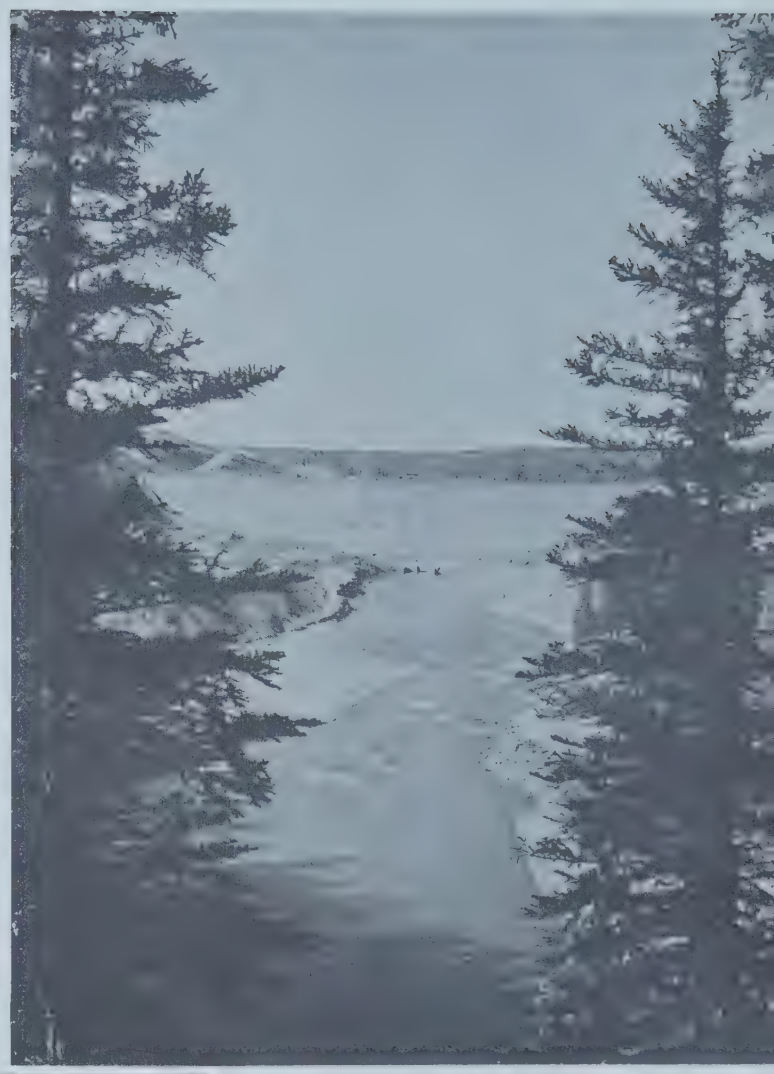
BRAZEAU

Alberta (1961-64)

HEAD: 390 feet

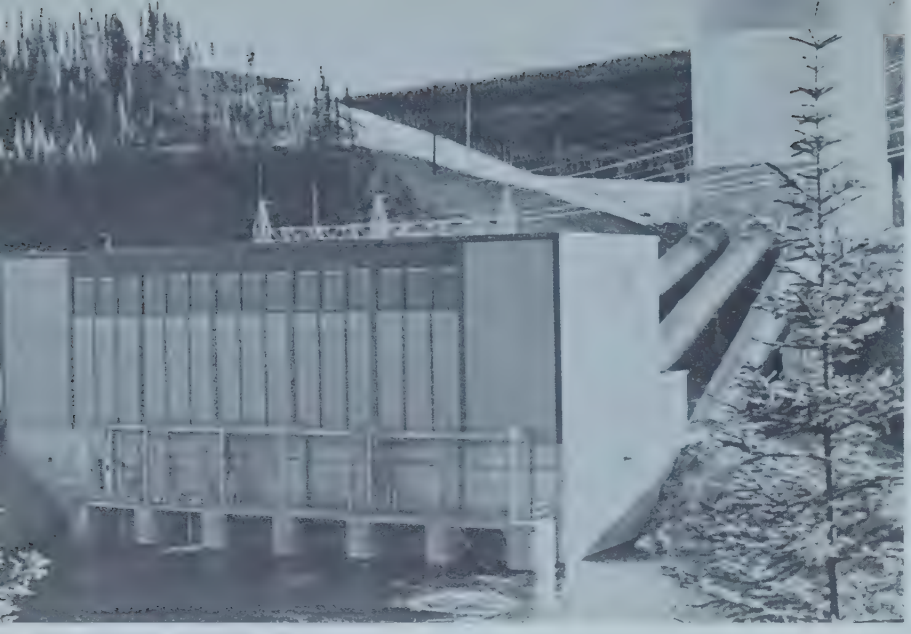
CAPACITY: 210,000 hp

Located 100 miles south west of Edmonton on the Brazeau River, this project for Calgary Power Ltd. will utilize the water stored behind a 230 ft high, 2,750,000 cy earthfill dam completed in the summer of 1961. The initial installation will consist of one 210,000 hp Francis turbine, with provision for further units. The generator will be rated 160 mva, 60° C rise, and 184 mva, 80° C rise. It will connect to a 240 kv bus through a 111/148/185 mva transformer. Facility for silsyn starting at 13.8 kv of large pumps in the same station will be provided.



View of the Brazeau development with the main dam in the background.

The Brazeau project during the early stages of construction.



The Hart Jaune Powerhouse showing the three twelve foot penstocks and the surge tank at rear.

HART JAUNE

Hart Jaune River, Quebec (1960)

HEAD: 130 feet

CAPACITY: 66,000 hp

This hydro-electric development on the Hart Jaune River, supplies power to Quebec Cartier Mining Company's mining development and town on Quebec's north shore.

Three sites have been developed to create a storage reservoir of 1,125,000 acre feet, a point for flood flow diversion and a power plant. The total volume of earth dams is 2,150,000 cu. yds. and the maximum height, 80 ft. The concrete spillway at the storage dam has a flood capacity of 60,000 c.f.s. At the power site a natural falls of 50 feet helps to develop the head.

A 20 ft diameter ring girder pipeline carries the regulated flow of 3,260 c.f.s. to a surge tank and three 12 ft diameter penstocks. The three Francis turbines of 22,000 hp each are coupled to 19,000 kva water-cooled generators. The generators are connected to a 13.8 kv bus with 500 mva air circuit breakers. From this bus, two 25/33/41 mva three phase transformers step up to a 138 kv switching structure which terminates a double circuit steel tower line of 10 miles length.

Plant control is completely automatic from the mine control centre over V.H.F. radio links. Frequency regulation problems caused by large load fluctuations from the mine shovels were met by giving the generators a very large fly-wheel effect and having a load sensing computer on one governor in addition to the normal flyball control.

Concrete spillway at the Hart Jaune Storage Dam. Flood capacity is 60,000 cubic feet per second.

Thermal Power Developments

Wabamun Plant showing extension and stack for third unit at right with switchyard in foreground.

WABAMUN

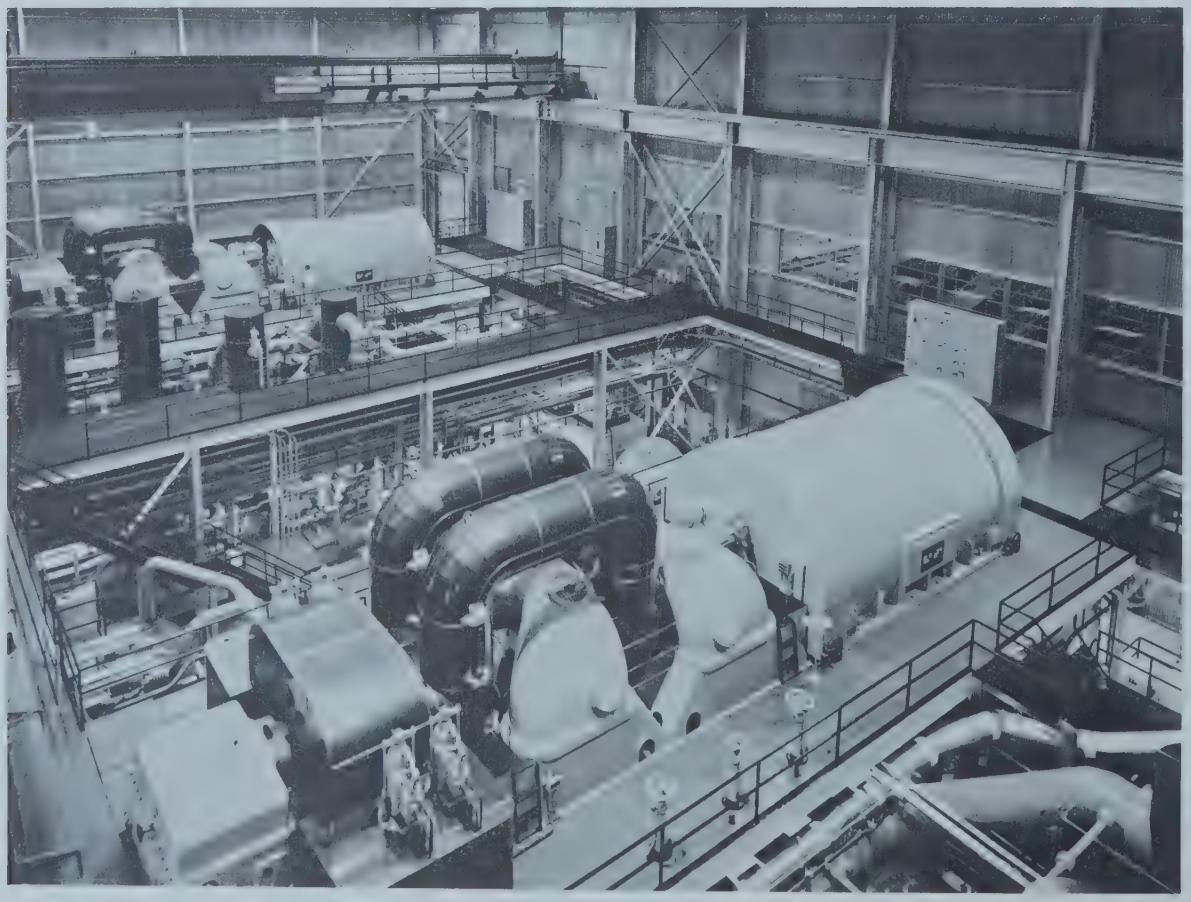
Lake Wabamun, Alberta (1956-58-62)

CAPACITY: 282,000 kw

Two 66 mw units are fired with natural gas fuel with light oil standby and are designed for conversion to pulverized coal firing. They were installed for a total cost of under $15,000,000.

A 150 mw unit extension, scheduled for commercial operation in the fall of 1962 will be coal fired with natural gas standby. The 66 mw units are connected to a 138 kv bus which ties through a regulating transformer to the 240 kv bus on which the 150 mw unit and all future units terminate. This is a double bus, with line breaker transfer bus and features pantograph type disconnects to conserve space.

The plant site, circulating water structures and coal handling equipment are designed for an ultimate development of over 1,000 mw.



The Turbine Hall at the Wabamun steam plant showing the two 66,000 kw turbo generator units.

ARREAGA

Maracaibo, Venezuela

CAPACITY: 181,700 kw

The Arreaga steam and gas turbine plants serve the city of Maracaibo and district. Gas from the neighbouring oil fields is used as fuel. Plant No. 1 contains seven units with a total capacity of 48,500 kw. One 66,000 kw and two 25,000 kw units, all "unit-system", are at present in operation in Plant No. 2. Plant No. 3 contains a 17,200 kw gas turbine unit.

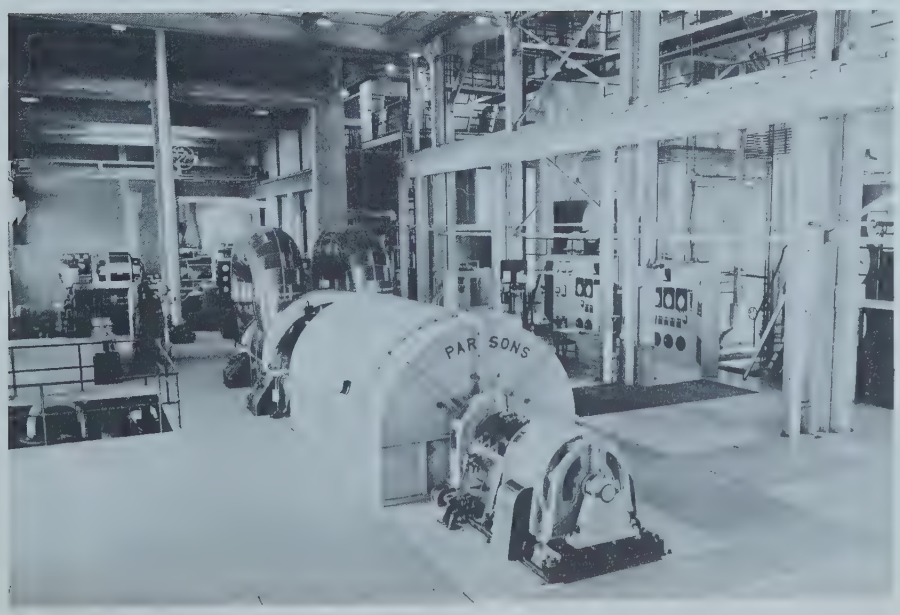
The units in plant No. 1 are connected to a 138 kv indoor bus which is tied through a 24/32/40 mva auto-transformer to the 24 kv bus. The 25 mw units of plant 2 and the 17.2 mw gas turbine connect through individual auto transformers to the 24kv bus. An 83 mva transformer ties the 25 kv and 138 kv busses and the 66 mw unit, 13.8 kv, is connected through a 60/80 mva transformer to the 138 kv bus.

An aerial view of the Arreaga plant compound.

MEDICINE HAT EXTENSION

Alberta (1953)

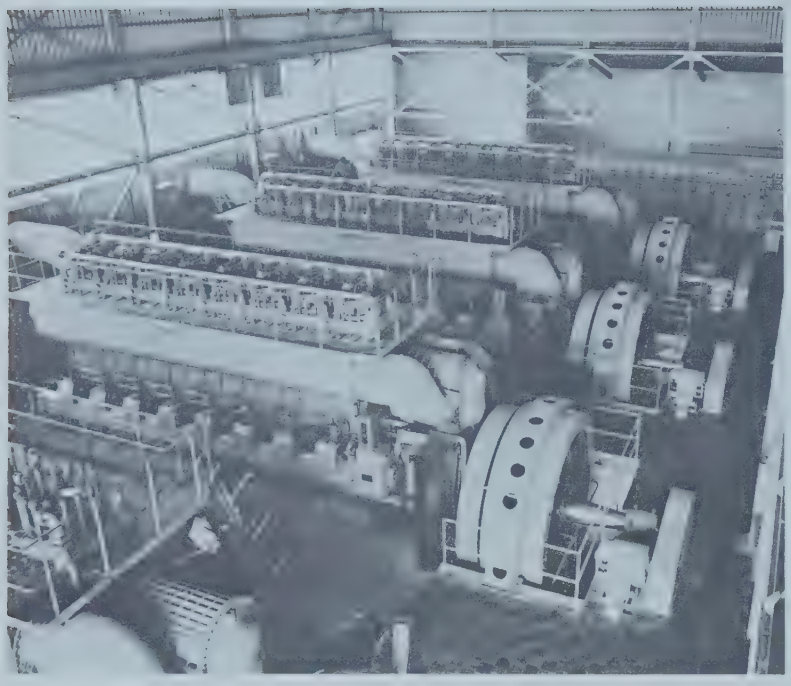
CAPACITY: 30,000 mw



Turbine Hall of the Medicine Hat steam plant.

This extension to the Medicine Hat Steam Plant contains one steam turbine and two natural gas fired boilers each rated at 175,000 lb per hr, 415 psi 750° F. Of the power generated, 5,000 kw is absorbed by the City of Medicine Hat, while the remainder is fed into the Calgary Power System.

This extension was built for less than $3,000,000 and is producing power at less than 3 mills per kw hr.



Barquisimeto Diesel Plant No. 1 contains ten modern diesel engines installed since World War II.

BARQUISIMETO DIESEL PLANTS

Venezuela

CAPACITY: 22,800 kw

Diesel plant No. 1 is the principal source of power for the city of Barquisimeto. It contains 10 modern diesel engines installed since World War II for the C.A. Energia Electrica de Barquisimeto.

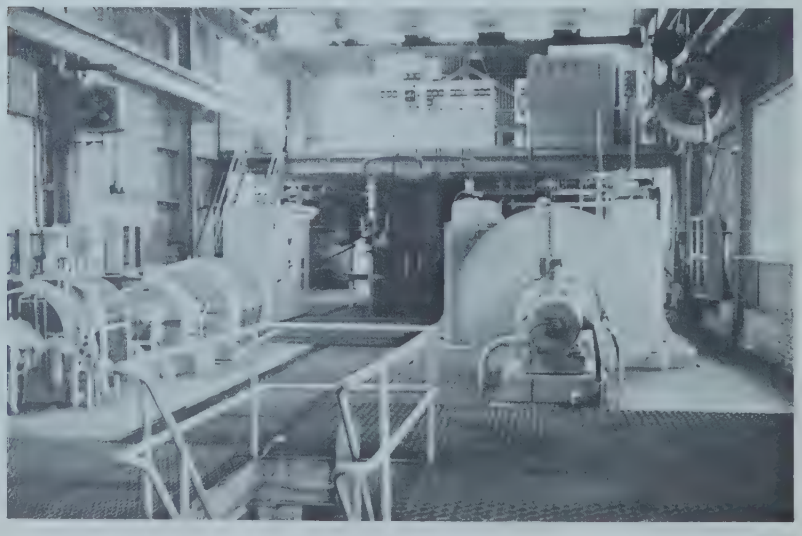
Plant No. 2, built in 1961 and housing the first of several 4,120 hp, 2,940 kw diesel generator sets, is now feeding power at 23 kv into the Barquisimeto system. A second set will be commissioned late in 1962. This plant is unmanned, being remotely controlled from Plant No. 1, some two miles distant, over a 51 pair control cable. Operating data from Plant No. 2 is telemetered to Plant No. 1, allowing startup, synchronizing, loading and shut-down of any number of units in Plant No. 2.

TWO HILLS CHLORINE PLANT

Two Hills, Alberta (1958)

The d-c power required by Western Chemicals Limited for chemical processes at its Two Hills plant is produced by a gas turbine unit rated at 6,200 kw 80°F), 8,400 kw (−40°F) with mercury arc glass bulb type rectifiers. Additional power is supplied by a 1,200 kw steam turbine which also serves as a pressure reducer for process steam.

Two Hills Chlorine Plant Turbine Hall showing 6,600 kw (at 80°F) gas turbo-generator.



Industrial and Municipal Engineering

PRICE BROTHERS' 200 TON KRAFT MILL

Jonquiere, Quebec (1961)

Montreal Engineering Company were retained to supervise the construction and to purchase and expedite all process equipment for this mill.

The mill includes general offices and machine shop, finishing and storage room, stock preparation plant, chemical preparation plant, ground wood mill, digester plant, evaporator plant, recovery boiler and precipitator plant, causticizing plant, including lime kiln building, washing and screening plant, bleach plant and chlorine dioxide plant. The mill is highly automated. Batch composition for finished board is controlled by a punch card system. Change of grades of Kraft can be accomplished in about 30 minutes. Construction started in June 1960 and was completed in February 1962, a total construction period of 21 months.

This building houses equipment for producing the food seasoning, monosodium glutimate, commonly known as M.S.G. The structure is steel framed with brick walls and reinforced concrete floors supported on a Franki pile foundation.

OGILVIE MILLS, MONTREAL, QUEBEC (1953)

Section of the utilidor showing a valve house and utilidettes leading into the homes.

INUVIK

Northwest Territories (1958-59)

The Company engineered all the utilities (electric power, central heat, water supply, sewage disposal and fire alarm system) required to serve the new town of Inuvik for the Northern Canada Power Commission. All utility mains are carried in insulated utilidors a system of steel and aluminum boxes 17,000 feet long. The unique feature of this project is the support of the power station, auxiliary structures, and utilidors aboveground on piles set in permafrost. Ventilation under the structures prevents deterioration of the permanently frozen ground. Power distribution is at 4160 volt on overhead lines supported on wood poles augered into the permafrost.

No. 4 BOILER AND FEEDWATER SYSTEM EXTENSION

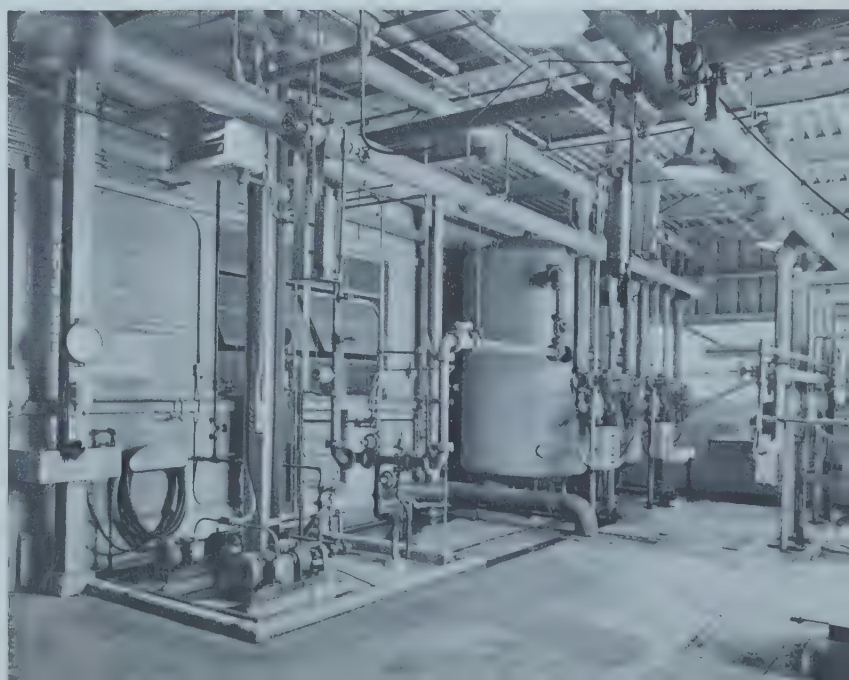
Union Carbide Canada Limited Montreal East Plant (1958)

The pressure fired boiler unit is rated at 100,000 lbs/hr 410 psig 500 degrees fahrenheit.

The boiler is gas and/or oil fired under fully automatic combustion control and it is equipped with flame failure protection and power failure protection permitting continuous operating on failure of main power supply.

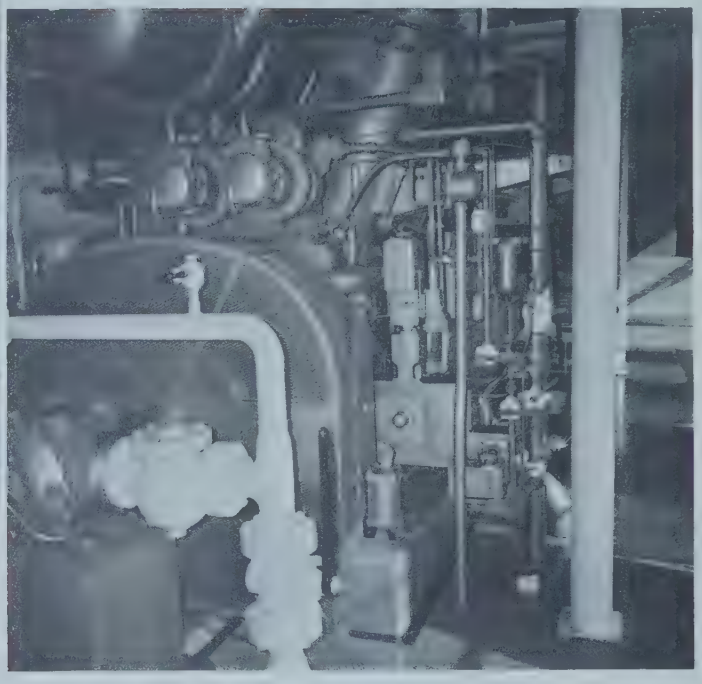
Steam is supplied to process and heating services and prime movers at 410 psig and 250 psig with auxiliary steam supply at 175 psig, 35 psig, and 10 psig.

In conjunction with this boiler a new 300,000 lbs per hour feedwater system was installed capable of supplying deaerated water to all existing and contemplated future boiler units and incorporating one of the largest automatic split stream de-alkalisation water treatment plants ever installed in Canada. This system too was designed to provide continued operation even after main electric power supply failure.



Automatic regeneration equipment and zeolite tanks at the Montreal East Plant of Union Carbide Canada.

The main 30 inch high pressure gas headers with 14 inch headers going into compressor building.



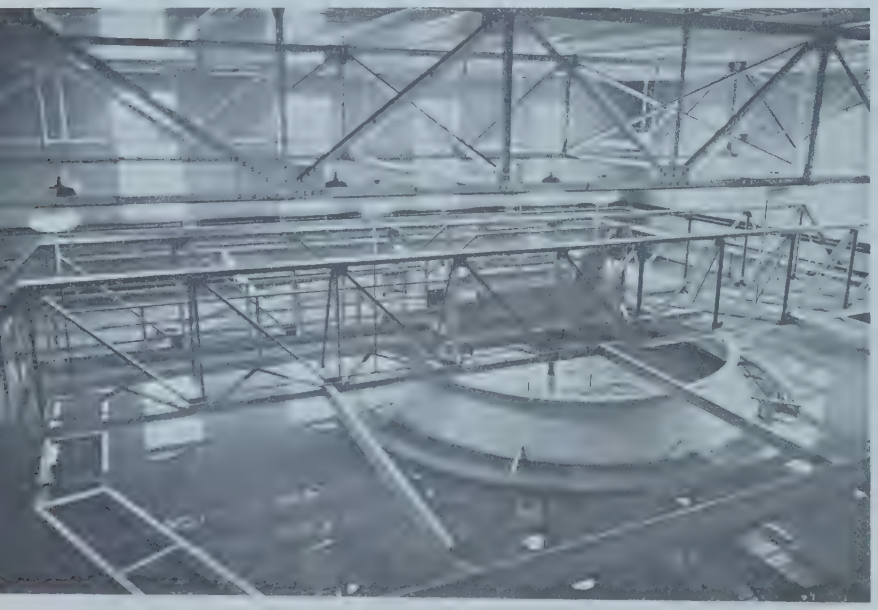
End view of gas engine installation at Ramore.

RECIPROCATING COMPRESSOR STATION

Ramore, Ontario.

This is one of the two reciprocating engine stations constructed in 1961 for Trans-Canada Pipe Lines Limited. It consists of a compressor-auxiliary building which houses three 2,000 hp gas driven Ingersol-Rand engines and includes space for a fourth. Separated from the compressor hall is the auxiliary room which houses a control room, a boiler, communications and other equipment. A utility building has been provided for maintenance and storage purposes. A meter building and an office building complete the station.

Under ideal conditions each engine will handle 207,000,000 cubic feet of gas per day.



Interior view of waterworks showing Graver reactivator.

WATER WORKS EXTENSION

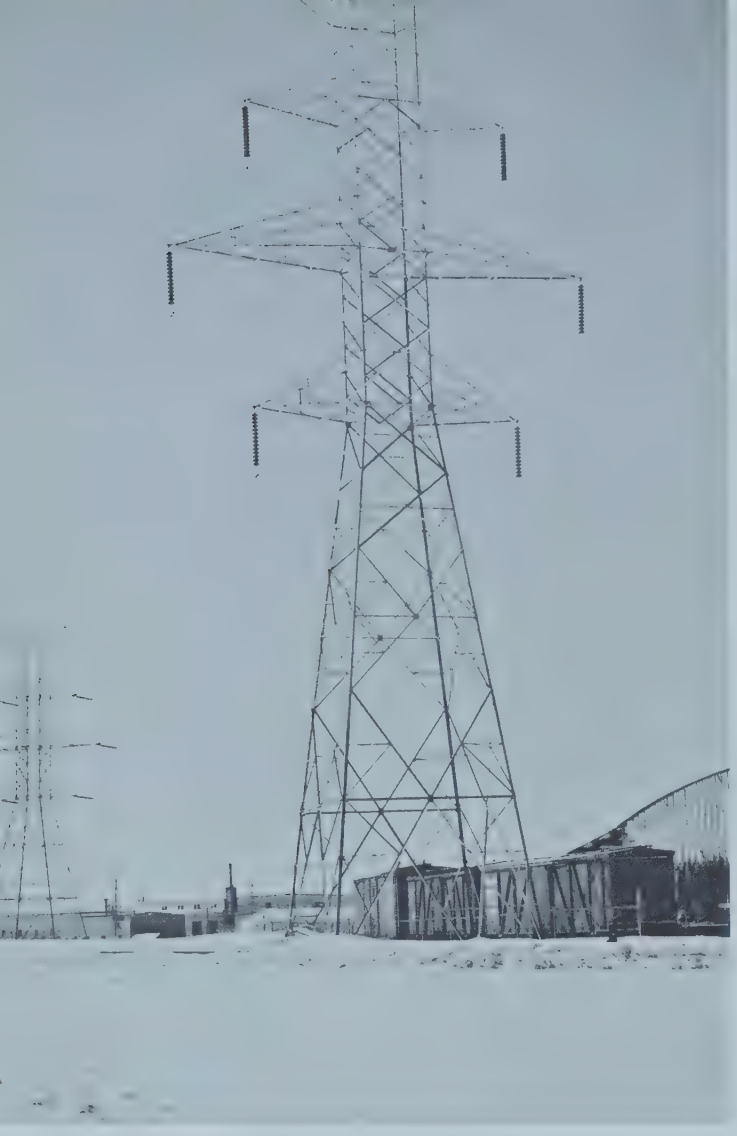
Medicine Hat, Alberta (1956)

POPULATION: 18,000
ULTIMATE CAPACITY OF EXTENSION: 6,000,000 IGPD

The Extension comprises a concrete sedimentation basin, two rapid sand filters each divided into two halves by a wash gullet with space for two future filters, a 100,000 imperial gallon clear well connected to the one in the existing plant, and associated piping and valves. Sedimentation is carried out by a Graver reactivator with a rate of rise equal to 1.5 USGPM/ft^2. Alum is added to aid coagulation by a volumetric type feeder. The filter facilities are equipped with manual compressed air pressure controls.

Prechlorination is carried out in the sedimentation basin, and post chlorination in the high lift pump suction chamber located in the existing plant.

Transmission and Distribution



Part of seven mile 230 kv double circuit line extending from Sarcee Corner to East Calgary Substation.

CALGARY POWER LTD.

230 Kv Double Circuit Line (1955)

This line in Alberta consists of part of the No. 150 line from East Calgary Substation to Ghost Plant and part of the No. 3 line from East Calgary Substation to the Horseshoe Plant. The line was constructed for final operation at 230 kv but is operating initially at 138 kv.

The survey for the line route, locating of towers and erection supervision was by Calgary Power Ltd. Montreal Engineering Company acted as general consultants for the line. Included in this work was the preparation of tower specification, purchasing towers and checking manufacturer's designs.

KUNDAH PLANT No. 1 TO PLANT No. 2 TUDIYALUR LINE

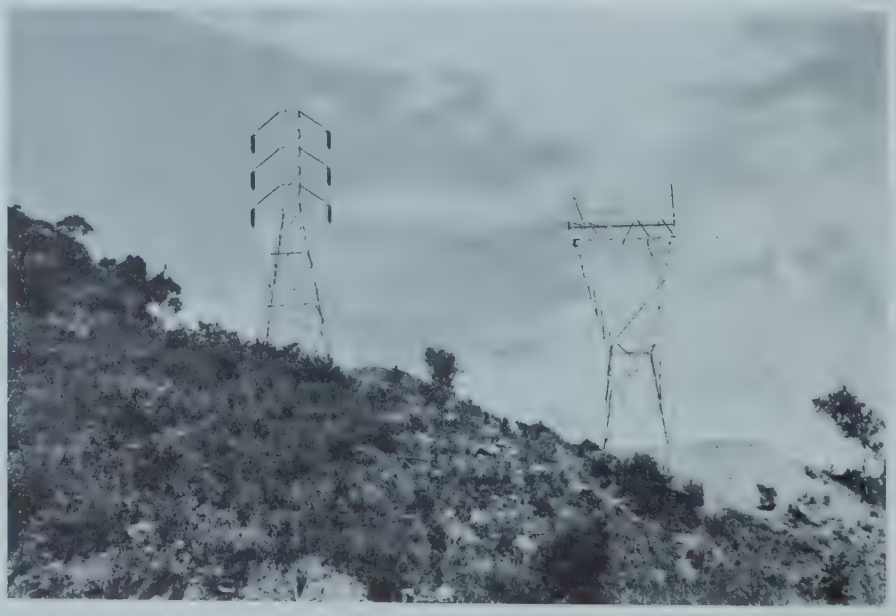
Madras State, India (1961)

This line was constructed to transmit power generated by Kundah Plants Nos. 1 & 2. It serves as a tie line between the Western and Southern Divisions of the Madras Grid. Owing to the corrosive soil in Madras state all tower stubs and footings were encased in concrete. A pyramid-shaped base was poured around the footing and a chimney around the stub to a point nine inches above ground level.

RAILWAY POLE LINE

Port Cartier to Hart Jaune, Quebec (1961)

This project consists of 200 miles of wood pole, pintype, 34.5 kv, three phase, power transmission line carrying in addition an insulated open wire communication pair for four channels of carrier communication. As well as supplying power or the communication equipment at six wayside stations on the railway, it also supplies track switch heater and tunnel de-icing installations.



110 kv double circuit line on left and 230 kv single circuit line on right during erection.

MARACAIBO DISTRIBUTION

Venezuela

C.A. Energia Electrica de Venezuela supplies and distributes electric energy to the City of Maracaibo, the center of the Venezuelan oil industry. This utility has experienced load growths ranging from 20% to 35% per annum and as a result, distribution planning and construction has been at a very rapid pace. Montreal Engineering Company, Limited provides a complete engineering service for this company.

During the past 15 years the distribution voltage has been increased from 2,300 volts delta to 4,160 volts grounded wye and then to 8,320 volts grounded wye. Some areas are supplied at 13,800 volts and rural customers at 24,000 volts.

All substation transformers are equipped with on load tap changing equipment and the distribution feeders have three shot reclosing relays. The substations are unattended. A remote supervisory system controls the sub-transmission supply lines to the substations and gives warning of equipment malfunctions and breaker trip outs. Load shedding can be affected by opening distribution feeders on a "stop" group basis either manually from the generating plant or automatically on under frequency or no voltage. The breakers may be remotely closed from the generating plant.

La Trinidad substation north of the Arreaga plant which will eventually connect with the Coromoto substation to the south-west of the Arreaga plant

Typical distribution pole showing underground tap off for new apartment building in Maracaibo suburb.

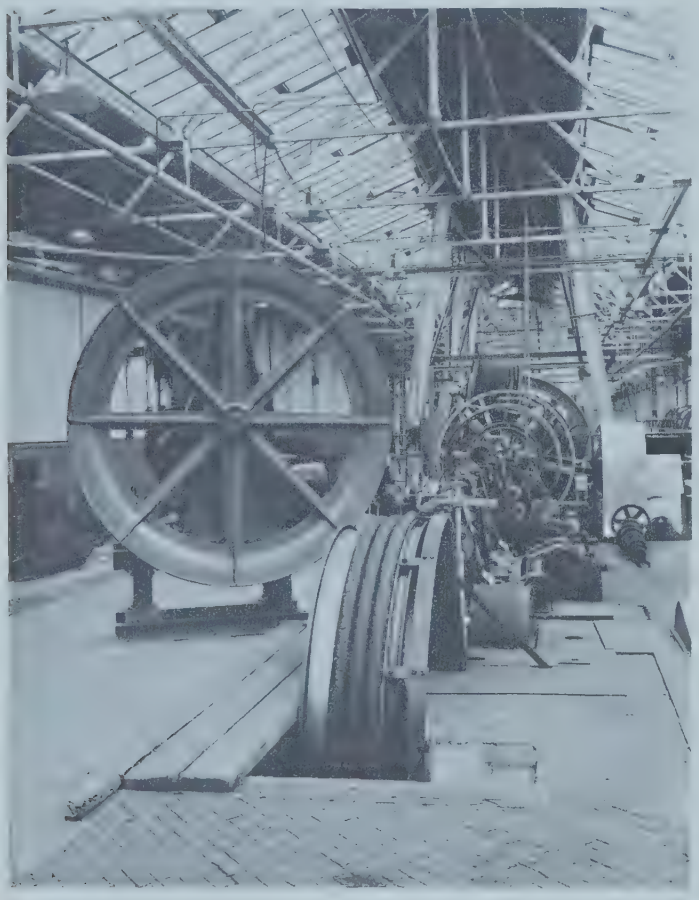
EASTERN DIVISION DISTRIBUTION

Newfoundland

The Newfoundland Light & Power Company Limited provides electric utility services to the island of Newfoundland through three divisions, the Eastern, Central and Western. The eastern division generates and distributes electrical energy to the City of St. John's and several large industrial customers. The central division generates and distributes to Grand Falls, Bishop Falls, Lewis Port, Gander and outlying rural districts and the western division to Corner-brook, Deer Lake and adjacent rural areas.

The eastern division system has grown from a peak in 1924 of 1,000 kva served by one sub-station, to the present day peak of 32,000 kva served by five substations. Overhead construction is used throughout and bundled primary conductors are used in the main business sections. Distribution primary voltage has been increased from 2,400 volts to 4160 volts and sub-transmission voltage changed from 13 kv to 33 kv with provision to change to 66 kv.

Montreal Engineering Company Limited have designed and supervised installation and maintenance of two 14 kv submarine cables which have been in service for some 20 years for the supply of power to the Wabana Iron Mines on Bell Island. A third cable rated 33 kv was installed in 1955 to augment this supply.

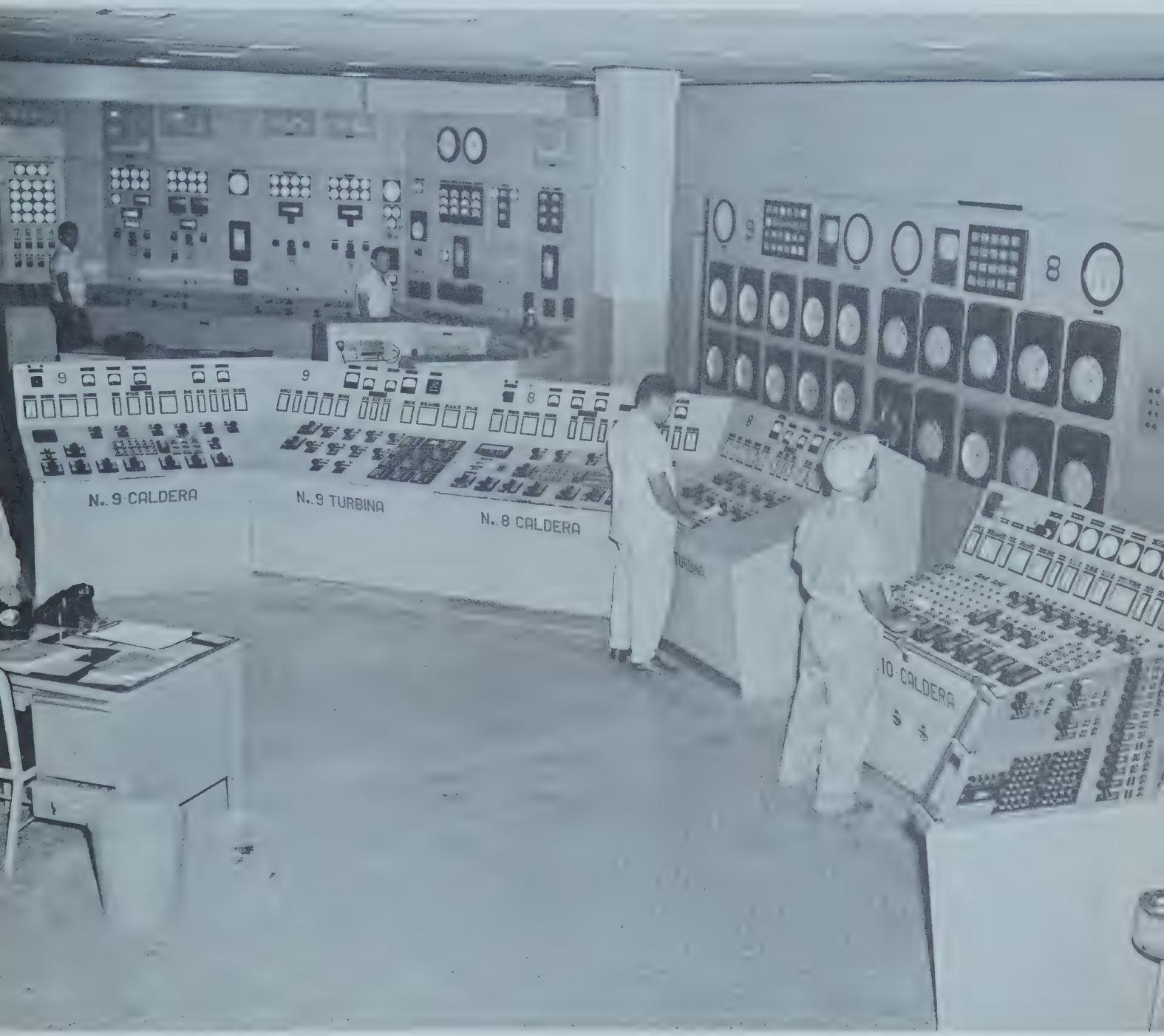


Laying submarine cable which runs from Bell Island to Broad Cove near St. John's, Newfoundland.

INTERCONNNECTING LINE SMELTER POWER CORP — SAGUENAY TRANSMISSION

Chicoutimi, Quebec (1957)

The 161 kv transmission line constructed for the Smelter Power Corporation connects with the Saguenay Transmission Co. Ltd. system at Chicoutimi, Quebec. The photo opposite shows the tap off tower under erection.


N. 9 CALDERA
N. 9 TURBINA
N. 8 CALDERA
10 CALDERA

TRANS CANADA PIPE LINE VHF RADIO SYSTEM

Burstall, Alberta to Winnipeg, Manitoba (1961)

This installation covers 14 repeater stations and 20 fixed central stations communicating between manned compressor stations and 50 truck units across 600 miles of gas pipe line between Burstall, Alberta and Winnipeg, Manitoba.

At each repeater station high gain antenna arrays are mounted on 200′ triangulated steel lattice towers. Radio equipment is housed in wooden buildings at the base of the towers, each being complete with auxiliary standby power supply.

The system is divided into four sections with their control centers each operating remotely the two adjacent central stations on either side. Provision is made for end to end communication.

Erection of a 200 ft. triangulated steel lattice tower on which high gain antenna arrays will be mounted.

Edmonton supervisory desk and V.H.F. radio controlling the Buck Creek and Calmar pumping stations.

PEMBINA PIPELINE REMOTE CONTROL

Buck Creek and Calmar, Alberta (1962)

The operations performed by the supervisory at Buck Creek are the opening and closing of the farm tank valves and the remote indication of their position, the starting and stopping of both booster and main pumps and indication of their condition, and the adjustment of the throttle valve and indication of its limited conditions. The station is designed to be self protecting in that faults developing will operate relays which will cause shut down of the equipment either on a lock-out or non-lock-out condition. An interesting feature of the operation of this station is the use of a power limiting device.

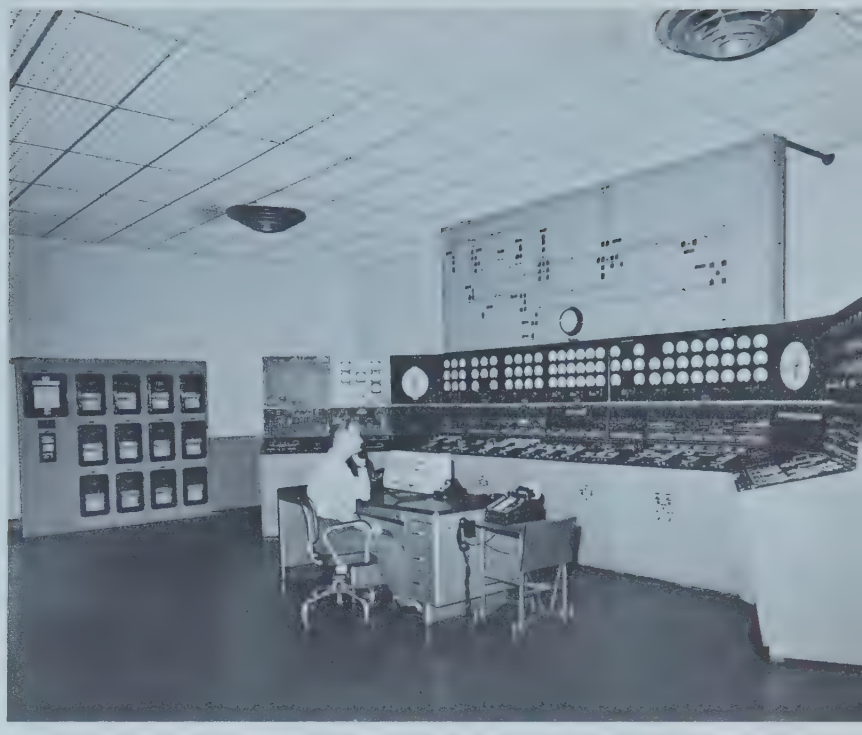
At Calmar the supervisory operations are confined to the starting and stopping of pumps, their indication and the indication of certain alarms. There is no throttle valve control or telemetering.

KANANASKIS CONTROL CENTER

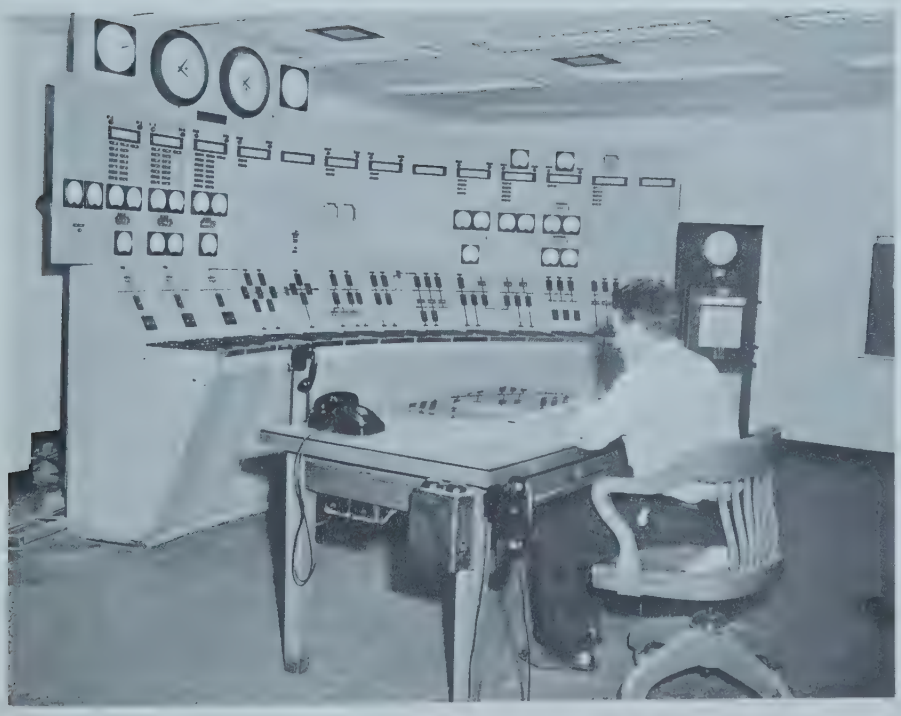
Seebe, Alberta

Remote control of hydro power plants was first introduced into the Calgary Power System in 1946. It has resulted in improved system operation and made possible a reduction in staff requirements of more than 50%.

Ten of the eleven automatic hydro plants in the system are remotely controlled from the control center which is located adjacent to one of the plants at Seebe, Alberta. The ten plants contain 21 units ranging from 3,600 hp to 63,000 hp. Under normal conditions these plants, totalling 389,500 hp, are all handled by one operator.



The control center at Seebe, Alberta, which is completely equipped for the remote operation of ten hydro-plants and two pumping stations.

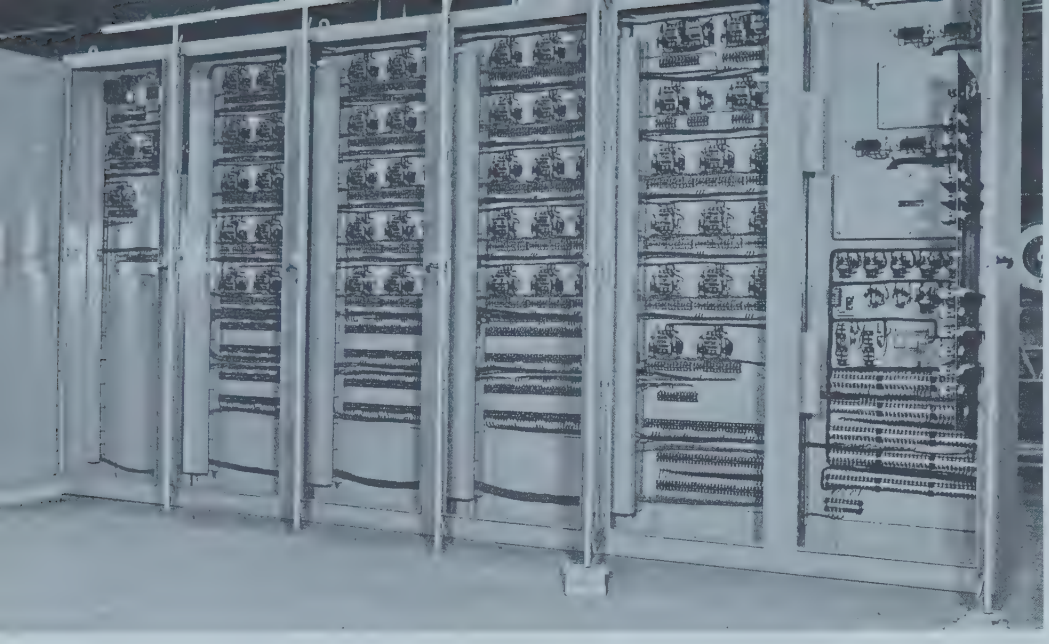


ST. JOHN'S CONTROL CENTER

St. John's, Newfoundland

Three of the hydro plants, totalling 27,000 kva, in the eastern division of the Newfoundland Light & Power system are automatic and are remotely controlled from the system control center located in St. John's. In addition, three switching stations and three city substations are operated from the control center.

St. John's system control center equipped for the remote operation of three hydro-plants and five substations.



Rear view of control panel wiring at the Wabamun steam plant.

WABAMUN CONTROL ROOM

Alberta, Canada

Two men on shift operate the two existing units in the Wabamum plant from a control room which contains all necessary indicators, recorders and control circuits. The controls are electronic providing rapid response, adaptability and ease of maintenance. An automatic logger records all pertinent operating information with instantaneous plant gross heat rate being computed and indicated at all times.

ARREAGA CONTROL ROOM

Maracaibo, Venezuela

One centrally located, air conditioned control room is used to house both the mechanical and electrical control equipment for all three units of Arreaga No. 2 Plant as well as the electrical controls for plants Nos. 1 and 3. The main control system for both the turbo-generators and steam generators was supplied by the Bailey Meter Company. At the time the Mini-Line control equipment was ordered for unit No. 8 it was the first of its kind to be purchased for use outside the U.S.A.

General view of the central control room at Arreaga Plant No. 2

DAWSON CITY UTILITIES

Yukon (1961)

Northern Canada Power Commission

Montreal Engineering Company made a field appraisal of existing hydro and diesel power supplies, domestic water and sewer facilities and distribution of power to the City of Dawson; studied the power generation facilities and the desirability and cost of improvement or replacement of present transmission and distribution systems, and cost of replacing or revamping the present water and sewer system in the permafrost type sub-soil.

The results of these investigations will assist the client and the Yukon Territorial Government in future plans for Dawson City.

WINTER OPERATION OF THE BEAUHARNOIS CANAL

Beauharnois, Quebec (1961)

Quebec Hydro-Electric Commission

A study of ice formation on the Beauharnois Canal during the winter of 1960-1961 with recommendations for ways and means of minimizing the formation of hanging dams and thus increasing the canal flow and output of the Beauharnois power station in future years.

DUNCAN LAKE DEVELOPMENT

Duncan Lake, British Columbia (1960)

British Columbia Hydro and Power Authority

Study of the feasibility of building an earth fill storage dam on the Duncan River near the outlet of Duncan Lake with special attention to the difficult foundation problems of building on deep alluvial deposits. This project is part of the development of the Columbia River in Canada. The work involved a complete site investigation program of drilling, test pitting and soil and rock analysis and an engineering study with cost estimate. (Height of dam 100' Volume 5,000,000 cu. yds.).

POWER SUPPLY FOR THE COCHABAMBA DISTRICT

Bolivia (1961)

Corporacion Boliviana de Fomento, Bolivia

Field reconnaissance, investigations and appraisal of 5 hydro sites and 3 thermal alternatives, with the object of selecting the most rational program of development of the electric power system for the Cochabamba District.

The conclusions of the First Stage Report, recommending the selection of the Corani Hydro Site for the first plant to be built, have been accepted by the CBF, and the preparation of the second stage report on the Corani Hydroelectric Project is now in progress.

COLUMBIA RIVER DEVELOPMENT

Office Study (1961)

Department of Northern Affairs and National Resources

A study of all factors affecting the cost to Canada of power resulting from development of the Columbia River with special reference to the terms of the "Treaty between Canada and the United States of America Relating to Co-operative Development of the Water Resources of the Columbia River Basin".

POWER SUPPLY FOR PARAGUAY

Paraguay (1960)

Canadian International Power Company Limited

A study of the existing power supply and distribution system for the City of Asuncion and region, and the alternative ways of meeting and expanding power requirements of the area. The work involved the appraisal of a site for a thermal station and investigation of a hydro electric plant on the Acaray River in Eastern Paraguay with transmission line to Asuncion. Complete engineering studies and cost estimates were prepared for all alternatives.

ENERGY DEMAND FORECAST

Ontario and Quebec (1960-1975)

Home Oil Company, Limited, Calgary

This study was a projection of future energy requirements in the provinces of Ontario and Quebec. For comparison, the historical and projected energy demand were also developed for Canada as a whole. Coal, petroleum gases and electric energy were the major energy sources included in the estimates of future requirements.

INTERNATIONAL BOUNDARY WATERS

Columbia River (1957)

Government of Canada Department of Northern Affairs and National Resources

A technological and economic study of the Kootenay and Columbia Rivers in Canada with preparation of comprehensive plans of development independent of, or in collaboration with the United States of America. This work involved careful appraisal of topographic and geological features of the region, analysis of water supplies in Canada and over the entire international basin, computation of power supply and estimating of costs and benefits.

TAVERA HYDRO-ELECTRIC PROJECT

Dominican Republic (1957)

Government of the Dominican Republic

Hydrological conditions were studied, foundation conditions at the damsite were investigated, and the reservoir basin measured by aerial mapping. A report was subsequently prepared recommending the types, sizes, and general arrangement of structures best suited for the combined development of power and irrigation at the site.

FRESH WATER SUPPLY FOR A PULP MILL NEAR THE STRAIT OF CANSO

Strait of Canso region, Nova Scotia (1955-58)

Nova Scotia Power Commission

A study of the hydrologic regime of the region and of the means of developing the watersheds to provide a dependable process water supply of 25,000,000 Imp. gallons per day initially, with ultimate capacity of 60,000,000 Imp. Gallons per day, in order to prove the feasibility of locating a pulp mill in this area.

MARITIME POWER INVESTIGATION

New Brunswick and Nova Scotia (1957)

Northern Canada Power Commission

Montreal Engineering Company made a study of the electric loads in New Brunswick and Nova Scotia and estimated the probable generation over a ten year period; investigated the desirability and cost of interconnecting the major power systems in the two provinces; and studied the power generation facilities which will be required to supply the prospective load. This report assisted the Government of Canada in formulating its policy for aiding the Maritime Provinces with their power supply programs for the future, including interconnection of the transmission systems of New Brunswick and Nova Scotia.

RECONNAISANCE OF HYDROELECTRIC SITES

Iran (1956)

Plan Organization of Iran

The Government of Iran retained Sanderson and Porter to make a nation-wide electric power survey with the object of improving the country's present and future power supplies. Montreal Engineering Company collaborated with Sanderson and Porter in this work by conducting a reconnaissance of hydroelectric sites of Iran.

Partial List of Clients

Anglo-Newfoundland Development Co. Ltd.
Atomic Energy of Canada Limited
Bolivian Power Company Limited
Bowaters Mersey Paper Company Limited
Bowaters Newfoundland Pulp and Paper Mills Ltd.
British Columbia Hydro and Power Authority
British Guiana Electricity Corporation
British Newfoundland Corporation Ltd.
Calgary Power Ltd.
C.A. Energia Electrica de Barquisimeto
C.A. Energia Electrica de Venezuela
Canadian Chemical Company Ltd.
Canadian International Paper Company
Canadian International Power Company Limited
Churchill River Power Company
Citizens Utilities Limited
City of Medicine Hat
Compania de Alumbrado Electrico de San Salvador
Consolidated Mining & Smelting Co. of Canada Limited
Corporation Boliviana de Fomento
Defence Construction (1951) Limited
Department of Northern Affairs and National Resources
Department of Trade and Commerce
Eastern Light & Power Co. Ltd.
Eastern Mining and Smelting Corporation Limited
Eldorado Mining and Refining Limited
Government of Bolivia
Government of Paraguay
Gulf Power Company
Home Oil Company Limited

Hudson Bay Mining and Smelting Co. Ltd.

Imperial Oil Limited

International Power Co. Ltd.

Iron Ore Company of Canada Limited

Jamaica Public Service Ltd.

Lenkurt Electric Co. of Canada, Ltd.

Maritime Electric Co. Ltd.

Monterrey Railway, Light & Power Co.

Newfoundland Light & Power Company Ltd.

Northern Canada Power Commission

Nova Scotia Light & Power Co. Ltd.

Nova Scotia Power Commission

Nova Scotia Pulp Limited

Oceanic Iron Ore of Canada Limited

Ogilvie Flour Mills Co. Ltd.

Ormiston Mining & Smelting Co. Ltd.

Ottawa Valley Power Company

Pembina Pipe Line Ltd.

Price Brothers & Company Limited

Quebec Cartier Mining Company

Quebec Hydro Electric Commission

Smelter Power Corporation

South American Gold and Platinum Company

Stora Corporation

The Bowaters Power Company Limited

Trans-Canada Pipe Lines Limited

Union Carbide Canada Limited

Western Chemicals Limited

Westwood Fibre Products Ltd.

Recent Major Projects

BRAZEAU STORAGE & POWER PROJECT
Brazeau River, Alberta
Calgary Power Ltd.

KUNDAH Stages I & II (Colombo Plan)
Madras State, India
Madras State Electricity Board

*HART JAUNE POWER DEVELOPMENT
Lac Jeannine, Quebec
Quebec Cartier Mining Company

SPRAY-RUNDLE POWER DEVELOPMENT
Spray River, Alberta
Calgary Power Ltd.

SNARE FALLS POWER DEVELOPMENT
Snare River, N.W.T.
Northern Canada Power Commission

ARREAGA GAS TURBINE PLANT
Maracaibo, Venezuela
C.A. Energia Electrica de Venezuela

INUVIK — TOWN HEATING & UTILITIES
Inuvik, N.W.T.
Northern Canada Power Commission

ARREAGA STEAM PLANT NO. 2
Maracaibo, Venezuela
C.A. Energia Electrica de Venezuela

WABAMUN STEAM PLANT,
Wabamun, Alberta
Calgary Power Ltd.

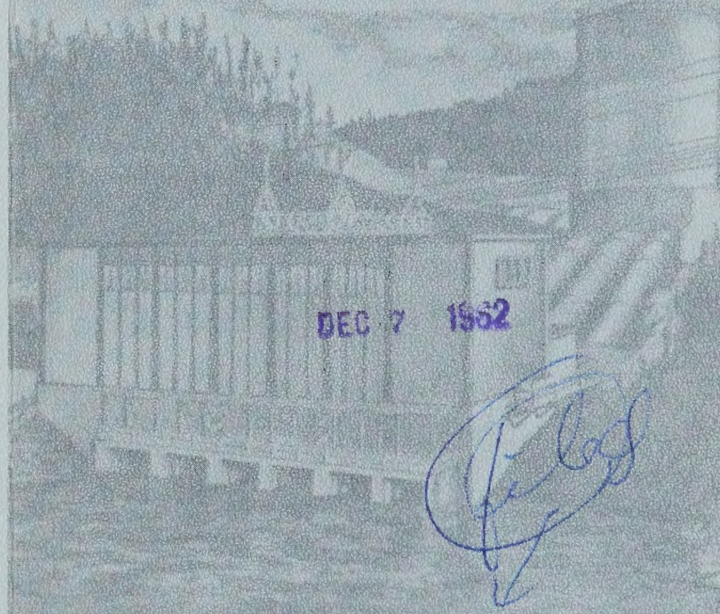
RATTLING BROOK POWER DEVELOPMENT
Rattling Brook, Newfoundland
Newfoundland Light & Power Co. Ltd.

WHITEHORSE POWER DEVELOPMENT
Whitehorse, Yukon
Northern Canada Power Commission

** Cover Sketch*

A Company Owned and Operated by

Professional Engineers



MONTREAL ENGINEERING

COMPANY, LIMITED

MONTREAL CALGARY

HEAD OFFICE: 244 ST. JAMES ST. W.
MONTREAL, QUEBEC

Directors

G. A. GAHERTY, LL.D., P.Eng. — Chairman of the Board, Calgary Power Ltd. — President, Montreal Engineering Co. Ltd. — Director, Royal Securities Corp. Ltd., and others.

F. KRUG, P.Eng. — Chairman of the Board, International Power Co. Ltd. — President, Canadian International Power Co. Ltd. — Vice-President, Montreal Engineering Co. Ltd. — Director, Royal Securities Corp. Ltd., Arcturus Investment & Development Ltd., The United Corporation, and others.

D. STAIRS, O.B.E., M.C. D.Eng., LL.D., P.Eng.— President, Newfoundland Light & Power Co. Ltd., Maritime Electric Co. Ltd. — Vice-President, Montreal Engineering Co. Ltd. — Director, Calgary Power Ltd., Royal Securities Corp. Ltd., and others.

G. H. THOMPSON, M.C., P.Eng. — President, Calgary Power Ltd. — Vice-President, Montreal Engineering Co. Ltd. — Director, Newfoundland Light & Power Co. Ltd., and others.

M. G. TAYLOR, P.Eng. — President, International Power Co. Ltd. — Vice-President, Montreal Engineering Co. Ltd., and others.

C. RITCHIE, P.Eng. — Vice-President & General Manager, Montreal Engineering Co. Ltd.

P. W. RAYMER — Vice-President, International Power Co. Ltd. — Director, Canadian International Power Co. Ltd., and others.

A. W. HOWARD, P.Eng. — President, Calgary Power Investments Ltd. — Vice-President, Calgary Power Ltd., Montreal Engineering Co. Ltd.

H. J. McLEAN, P.Eng. — Director, Construction, Montreal Engineering Co. Ltd.

J. K. SEXTON, P.Eng. — Director, Civil Engineering, Montreal Engineering Co. Ltd.

Announcement

Dr. G. A. Gaherty, P.Eng., President, is pleased to announce that during the past year in order to improve and expand the company's organization and services, three members have been added to the Board of Directors, and three additional Vice-Presidents have been appointed. Elected to the Board were *A. W. Howard, P.Eng., H. J. McLean, P.Eng.,* and *J. K. Sexton, P.Eng.* The new Vice-Presidents are *A. W. Howard, P.Eng., M. G. Taylor, P.Eng., and C. Ritchie, P.Eng.*

The company's engineering department has also been re-organized and the following promotions and appointments have been made:
W. K. Carruthers, P.Eng., Director Mechanical Engineering
H. J. McLean, P.Eng., Director Construction
J. K. Sexton, P.Eng., Director Civil Engineering
W. R. Davis, P.Eng., Engineering Manager
A. Dobson, P.Eng., Chief Mechanical Engineer
J. K. C. Mulherin, P.Eng., Chief Construction Engineer
N. Rivington, P.Eng., Chief Electrical Engineer
W. J. Smith, P.Eng., Chief Civil Engineer.

C. RITCHIE, P.Eng.,

Vice-President and General Manager — Joined Montreal Engineering Company in 1940 as Design Engineer, was appointed Engineering Manager in 1953 and General Manager in 1955. Has had 24 years experience in engineering design, and the supervision and co-ordination of a wide variety of engineering services for public utilities and associated industries.

M. G. TAYLOR, P.Eng.,

Vice-President — Is President and Chief Operations Officer of International Power Company Limited and was formerly General Manager of the Nova Scotia Power Commission. Has had extensive experience in the management and operation of electric power utilities in Central and South America.

A. W. HOWARD, P.Eng.,

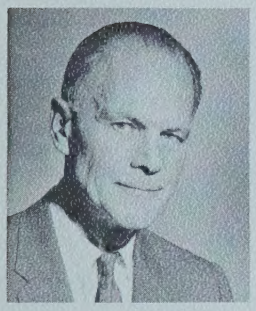
Vice-President — Is President of Calgary Power Investments Ltd., Vice-President of Calgary Power Ltd., a past-President of the Canadian Electrical Association and is Deputy Regional Director of the Dollar Sterling Trade Council. Has had extensive experience in the management and operation of electric power utilities.

W. K. CARRUTHERS, P.Eng.,

Director Mechanical Engineering — Joined the company in 1946 as Field Supervising Engineer, Mechanical. Was appointed Chief Mechanical Engineer in 1950. Has supervised the design, construction, commissioning and operation of a wide range of thermal power plants located in many areas of Canada, including the Arctic and in Central and South America.

J. K. C. MULHERIN, P.Eng.,

Chief Construction Engineer — Graduate of University of New Brunswick, 1945 (B.Sc.). Joined the company in 1946 as Construction Engineer. Since then, has had wide experience in the administration and supervision of construction of power and industrial plants and municipal services, much of which has been gained in the Arctic and sub-Arctic regions of Canada.



H. J. McLEAN, P.Eng.,

Director Construction — Is a specialist in the design and construction of earth fill dams and has had 39 years experience investigating, planning and supervising construction of power developments in Canada, the Caribbean, and Central and South America.

A. DOBSON, P.Eng.,

Chief Mechanical Engineer — Higher National Certificate, Mechanical Engineering with Endorsements, Kingston Technical College, England, 1951. Fourteen years experience in the design, construction, and operation of thermal electric generating stations, process steam and steam heating projects in Canada, the U.K. and Central and South America.

J. K. SEXTON, P.Eng.,

Director Civil Engineering — Is Vice-President of the International Commission on Large Dams and Vice-Chairman of its Canadian National Committee. Has had 32 years experience in the investigation, design and operation of hydro electric and thermal power developments in Canada, Central and South America, China and India.

N. RIVINGTON, P.Eng.,

Chief Electrical Engineer — Graduate of Queens University, 1942 (B.Sc.). Has had extensive experience in the design of the electrical features of a variety of hydro and thermal electric generating plants, transmission and distribution systems in North, Central and South America and Asia.

W. R. DAVIS, P.Eng.,

Engineering Manager — Has been associated with Montreal Engineering Company, Limited for the past 25 years and has had wide experience in the design, construction and operation of electric power systems. Is now responsible for the administration and co-ordination of all engineering services.

W. J. SMITH, P.Eng.,

Chief Civil Engineer — Graduate of Queens University, 1942 (B.Sc.). Is a specialist in turbine and governor problems and has had more than fifteen years experience in the investigation, planning and supervision of civil design of some 20 hydro power developments in India, South and Central America and Canada.

Montreal Engineering Company Limited Founded in 1907

is an independent Canadian organization owned and operated by its directors and senior professional staff.

Company personnel have had extensive experience in the design, construction, operation and management of electric power systems, which include hydro, steam, and diesel generating plants, transmission, distribution and communication systems. Industrial plants, Municipal utilities, and Water Supply and Drainage projects have also been successfully designed and construction supervised. A field of special interest has been the design of remote control systems for Hydro Plants and Pipeline Pumping Stations.

To date our staff has engineered more than 120 electric power systems and other industrial and municipal plant in areas ranging from the equator to the Arctic circle.

A complete procurement service is also available to clients through our Purchasing Department, the operations of which are worldwide in scope.

Engineering Department

The Engineering Department employs some 235 permanent personnel in four technical sections. With few exceptions the department's 150 engineers are specially selected graduates of Canadian universities who entered the service of the Company or one of its associates on graduation. They are supported by a staff of 45 technical assistants and draftsmen and an administrative group of 40 personnel.

Each section is under the technical direction of a Director of Engineering of more than 30 years professional experience, and is administered by a specialist Chief Engineer.

Construction Staff

The Company's construction organization is comprised of a competent group of area supervisors supported by some 30 highly qualified resident and field engineers.

An experienced contracts group is also available for service to clients.

Calgary Office

G. V. ECKENFELDER, P.Eng.,

Manager — Western Division — Has had twenty-three years experience conducting field investigations, preparing designs, and supervising the construction of hydro plants in Canada and the Far East. Since 1958, has been Manager of Calgary Office supervising company operations in the Western Provinces, the Yukon and North West Territories.